

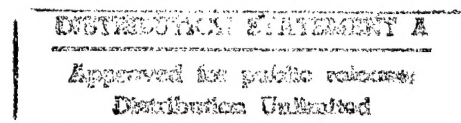
CONSERVATIVE VERSUS FAST TRACK RULE OUT MYOCARDIAL
INFARCTION PROTOCOLS: A COST AND LENGTH OF STAY COMPARISON
WITH LOW RISK CHEST PAIN PATIENTS IN A MILITARY HOSPITAL

A thesis submitted in partial fulfillment
of the requirements for the degree of
Masters of Science

By

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I HEREBY RECOMMEND THAT THE THESIS PREPARED UNDER MY SUPERVISION BY Paul D. McGough ENTITLED CONSERVATIVE VERSUS FAST TRACK RULE OUT MYOCARDIAL INFARCTION PROTOCOLS: A COST AND LENGTH OF STAY COMPARISON WITH LOW RISK CHEST PAIN PATIENTS IN A MILITARY HOSPITAL BE ACCEPTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF Masters of Science.

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ABSTRACT

McGough, Paul D. M.S., Wright-State University-Miami Valley College of Nursing, 1997. Conservative Versus Fast Track Rule Out Myocardial Infarction Protocols: A Cost and Length of Stay Comparison with Low Risk Chest Pain Patients in a Military Hospital.

Chest pain patients are traditionally treated in a conservative nature due to the severity of the complications which include death. The majority of the time, this means a coronary care unit admission for the chest pain patient to rule out myocardial infarction, even in patients considered at low risk for myocardial infarction. Over the past several years, hospitals have experienced overcrowding of the coronary care units, often times filled with these low risk chest pain patients. This places a financial burden on the insurers and frequently displaces patients in true need of a coronary care bed. In response to the crisis, hospitals across the country are opening chest pain centers in the emergency department to fast track these low risk patients. There are reports of success, many are a cost-effective alternative to an expensive coronary care admission while decreasing patients' length of stay in the hospital.

The purpose of this study was to determine: 1) what would be the cost benefit of entering patients at low risk for acute myocardial infarction into a fast-track protocol and 2) what would be the benefit in length of stay for the patient entered into a fast-track protocol.

A retrospective chart audit was conducted on 50 actual sample patients who were previously treated for chest pain and subsequently entered into a conservative ruled out myocardial infarction protocol. Research findings, using a Wilcoxon signed rank test showed; 1) hospitalization costs and length of stay were significantly higher for the conventional hospitalization., (mean conventional costs, \$3137), as opposed to the fast-track cost of \$847, ($T = 637.5$, $p = .0001$) and 2) the conventional length of stay was significantly longer than the fast-track length of stay if each patient's length of stay was one day using fast-track protocols ($T = 564$, $p = .0001$). The mean difference in length of stay was 1.22 days.

The results of this study have a broad range of implications for nursing practice, especially military nursing. The cost-effectiveness of fast-track protocols is likely to impact nursing in that more nurse managed centers will be created, requiring a better understanding of the potential for cost savings from the staff and management. Potential impact include nursing staff, education, clinical practice and administration. Fast-track protocols for the low risk chest pain patient is clearly a cost-effective alternative to conventional rule out protocols in a CCU.

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I. INTRODUCTION

Ischemic heart disease is the leading cause of death in the United States (235 deaths per 100,000 people annually) (Shesser & Smith, 1994). Patients with chest pain represent a considerable legal risk for hospitals especially those discharged to home from emergency rooms, later found positive for myocardial infarction (Murata, 1993). A way of avoiding this problem is to admit all patients with the diagnosis of chest pain, even if they are low risk for myocardial infarction. The cost of hospitalizing all patients with a diagnosis of chest pain to a Coronary Care Unit (CCU) would be staggering. In the 1980s, Fineberg and associates demonstrated that admitting all chest pain patients to the hospital would not be feasible and would be a considerable financial burden (Murata, 1993). Fineberg et al., demonstrated that admitting even low risk patients to the CCU would have increased costs nationwide by one million, two hundred and sixty thousand dollars per life saved (Murata, 1993).

Costs for the admission and inpatient evaluation of patients with chest pain are substantial, with estimates ranging from five to ten billion dollars each year Gibler, et al., (1995) Because only 30% to 40% of such patients are ultimately determined to have acute ischemic coronary syndromes, three to six billion dollars is currently allocated to hospitalize patients with non-cardiac chest pain.

The accurate assessment of chest pain is difficult especially if it is of unknown etiology. The responsibility of identifying a potentially life-threatening condition accompanied by chest pain presents the nurse and physician with a significant challenge. Only about 20% of the patients who present to the Emergency Department (ED) complaining of chest discomfort meet the traditional criteria for acute MI. (Apple, 1995). As many as 7% of patients with chest pain who are discharged after negative work-up for acute MI are later found to have been misdiagnosed (McCarthy, Beshansky, & D'Agostino, 1993). The risk of morbidity, mortality, and litigation in such cases is clear. Although a large portion of patients evaluated for chest pain in the emergency department will be sent home because the probability of acute myocardial infarction is determined to be sufficiently low, there is still a high incidence of patients admitted to the hospital who have non-cardiac chest pain .

With a shift toward managed care, hospitals are looking for innovative ways to protect their dollars. Various strategies have been proposed to increase the efficiency of managing patients with acute chest pain. As the largest group of professionals, nurses in hospitals are in an ideal position to analyze both the effectiveness and efficiency of care delivery systems (Daly, Phelps, & Rudy, 1991). Priorities of nurse managers must include devising innovative methods of care delivery that maintain or even improve the quality of care while accomplishing the objective of reducing cost (Daly et al., 1991). An example of a care delivery system that nurses can impact is chest pain centers which utilize fast

track protocols. Nursing has already demonstrated its ability to develop clinical and critical pathways which have been widely accepted throughout the healthcare arena.

Patients with chest pain represent a considerable legal risk for physicians working in an ED. In this setting, more malpractice dollars are awarded for missed myocardial infarction than for any other physician error (Murata, 1993). Some investigators have tried to improve the diagnostic accuracy of the general practitioner. Others have developed predictive models to identify patients at low risk in the emergency department to minimize unnecessary admissions. A third strategy included the creation of a simple observation unit (Grijseels et al., 1995). Several hospitals throughout the country have opened a chest pain center or observation area in the Emergency Department (ED) which provides comprehensive diagnosing and treatment of patients at low risk for acute myocardial infarction (AMI). These units employ accelerated protocols and the latest advances in cardiovascular technology aimed at reducing the admission of low risk chest pain patients to the CCUs and reducing the enormous costs of treating these patients (Grijseels et al., 1995). Fineberg, Scadden and Goldman (1984) in a landmark study disclosed that CCU care of patients with a low probability (5%) of MI cost \$2.04 million per life saved and \$139,000 per year of life saved, as compared with intermediate care. Kleiman (1994), estimates the cost of evaluating patients without MIs in CCUs has increased to an estimated \$10 to \$13 billion annually in the United States.

Chest pain centers (CPU) are among the most popular new ambulatory care services being added in U.S. hospitals (Anderson, 1991). In addition to evaluating the

patient with chest pain having a low probability of AMI (who under the traditional approach was discharged inadvertently from the ED), CPUs can be used to evaluate many such patients who have traditionally been admitted to the hospital. Fifty-five percent of patients with chest pain admitted to the hospital do not have cardiac disease. Most of these patients can be evaluated in CPUs at a savings of \$2000/patient compared with in-hospital admissions. Nationwide, the savings to the health care system are substantial. One billion dollars per year are saved for every 10% of ED chest pain patients (500,000 patients) who are evaluated in CPUs rather than hospital intensive care units.

Until recently, the military hospital was not uniquely concerned with the individual cost of an intensive care admission. When dealing with chest pain patients, as in the civilian sector, the admission to the CCU was preferred, even in the case of patients at low risk for AMI. According to the Coronary Care Unit log of a large Midwestern military hospital, the majority of the patients, considered at low risk, eventually rule out for an AMI, rendering justification to examine the use of a chest pain center protocol for expediting the diagnosis of an AMI in the military hospital setting. Heart programs for diagnosing acute myocardial infarctions are the current trend in many emergency departments. The use of chest pain centers expedite the diagnosis of an AMI, and frees bed availability in the coronary care unit.

Statement of Research Problem

Hospitals are rapidly transitioning to meet the demands placed by managed health care. Hospital closures, downsizing, and decreasing the length of stay for inpatients has remained a key focus throughout the transition. These demands have placed significant pressure on finding new approaches toward the same problems. The very survival of institutions will depend on smart financial management. As a significant element in the cost structure of most healthcare institutions, nursing units share a fundamental role in controlling costs while ensuring that quality of care will be maintained (Sengin & Dreisbach, 1995). In particular, chest pain centers are currently being evaluated to determine their efficacy with cardiac patients at low risk for an acute myocardial infarction.

Although gaining wide acceptance in the civilian healthcare setting, chest pain centers and fast track chest pain protocols are not currently utilized in the military hospitals. The CCU patient log in a Midwest military hospital shows the majority of patients admitted to the CCU for a rule out myocardial infarction are ruled out according to final discharge diagnosis. It is not known if utilization of fast track protocols will significantly decrease costs and length of stay for patients at low risk for AMI in a military setting.

Significance and Justification

The 1990s has witness a tremendous revolution in health care. There are fewer healthcare dollars, as a result, many programs may see cutbacks and closures. Hospitals

currently are preparing for the impact of healthcare reform by reducing their costs (Sengin & Dreisbach, 1995).

One impact managed health care has provided is finding new approaches to healthcare that are cost-effective. Multidisciplinary teams have formed specifically to address these issues. One approach of designing new care delivery systems, may consist of testing new nursing care roles and protocols (Daly et al., 1991). The resurgence of the nurse practitioner role and the interest in nurse administrators receiving an M.B.A (Master's in Business Administration) are two examples of the change in nursing care roles. The shift from a retrospective to a prospective payment system by the federal government for hospital care of the elderly has forced hospitals to examine their mission and how they do business. This has resulted in strategic planning processes leading to mergers, diversification, closing beds ("downsizing") and hospital closures (Daly, et al., 1991). Nursing's focus has shifted away from disease and more toward health prevention and community health care. The goal of health care providers is to decrease the number of patient days in the hospital. One way nursing has supported this is by taking the forefront in the development of clinical pathways and protocols. These guidelines enable the patient to recover at the optimum rate of speed within the hospital setting and provide a smoother transition to home for the patient.

Recent concerns about escalating health care expenditures have prompted health care payers and hospitals to analyze closely the average length of stay during hospitalizations. With a median cost of a CCU bed in the private sector being well over

\$1500 per day (Gaspoz et al., 1994) there is good reason to look at ways to decrease the length of stay in patients with low-risk chest pain. The utilization of a chest pain center protocol for patients with chest pain who are at low risk for myocardial infarction may have an enormous impact on length of stay and cost benefit for the hospital, ultimately increasing bed availability and bed utilization in the CCU. A further investigation of the benefit and impact on nursing services of chest pain center protocols in a military setting may prove advantageous.

The development and implementation of specialized ED programs for patients with chest pain are continually evolving, although the initial goals of "chest pain centers" may vary dramatically (Snyder, 1994). ED nursing staff play an important role in the delivery of rapid cardiac care, by providing an increase in the quality of care for patients at low risk for AMI while at the same time freeing the CCU of low risk patients and allowing the CCU to concentrate on the admissions of higher risk cardiac patients.

Although the military hospitals do not charge the patient for hospitalization per se, the hospitals have tightened the budget. Currently, the Air Force is looking at ways to better manage patient care. Several options, including managed care programs, are being implemented. By performing research and developing protocols through multi-disciplinary teamwork, nursing services can dramatically impact the future focus of care delivery systems. Ultimately, the Air Force's goal is similar to the private sector in trying to decrease patient hospitalizations and length of stay through better hospital management and utilization.

The utilization of chest pain center protocols to expedite the diagnosis of AMI would be a major step toward: 1) decreasing the patient's length of stay; 2) increasing bed availability in the CCU; 3) decreasing the possibility of chest pain patients being disengaged from the facility due to lack of bed availability; and finally, 4) decreasing the patient's anxiety levels.

From the nursing perspective, fast track protocols will impact staffing, quality of care and ultimately increase acuity levels in the CCU because the lower acuity patient will no longer need admission if treated in a chest pain center. Increased acuity levels puts a greater demand on the staff nurse and therefore causes a problem in itself.

Tremendous changes occurring in healthcare have created the need to redesign care delivery (Clochesy et al., 1994). Part of the redesign is the way in which patients are now managed. Case management tries to unite previously fragmented elements of care and members of the healthcare team to improve outcomes, minimize institutionalization of clients and reduce costs. Managed care and case management have been used together successfully in acute care hospitals, with positive results including reduced length of stay, reduced cost, and improved patient outcomes (Clochesy et al., 1994).

Statement of Purpose

The purpose of this study was first, through retrospective chart audit, to determine if those patients with chest pain who were at low risk for AMI would have potentially benefited from the use of a chest pain center protocol to rule out AMI. Second, to determine if decreasing the length of stay would be a cost benefit to the hospital.

Research Questions

1. What is the difference in length of stay, in days, between those patients at low risk for AMI treated conventionally when compared to treatment using chest pain center, fast track protocols.

2. What is the difference in cost for low risk AMI patients admitted to the CCU in a military hospital using conventional protocols versus chest pain center protocols.

Definitions

Chest pain center protocol refers to the utilization of alternative ways of diagnosing the etiology of chest pain and whether or not the chest pain is cardiac in nature; these include, but are not limited to, the testing for myoglobin in the blood, the acceleration of the standard rule out protocols, specifically the acceleration over time of serial isoenzymes and serial electrocardiograms and the same day use of treadmill testing in specific cases in order to identify those low-risk patients early in their hospitalization. The Heart ER Program protocol utilized in a Midwestern civilian hospital will be utilized for this research. The protocol is a comprehensive 9-hour evaluation (Gibler et al., 1995).

Low risk patients are those adult patients, who present to the hospital with chest pain, unknown etiology with no prior history, and limited or no risk factors, with minimal initial electrocardiographic and cardiac enzymes changes.

Length of stay refers to the amount of time a patient is hospitalized, usually stated in days or hours; hours and days can be calculated using the patient chart. For the purposes of this study, days will be used when length of stay is discussed.

Acute Myocardial Infarction (AMI) irreversible damage to myocardial cells usually caused by a thrombi to a coronary artery or an electrical disturbance. Damage is measured by specific blood enzymes and electrocardiograms and is documented in the patient's chart.

Conventional rule out AMI protocols typically include serial cardiac isoenzymes and electrocardiograms. For the purposes of this study, conventional rule out AMI protocols will include cardiac enzymes and electrocardiogram on admission and every eight hours for a minimum of a twenty four hour period, bed rest, and continuous cardiac telemetry/monitoring.

Costing out refers to the price of hospitalization whether it is inpatient or outpatient. This will be measured using standard pricing charts currently utilized in the resource management office of the Midwest military hospital.

Assumptions

1. Due to the threat of a myocardial infarction, Coronary Care Unit patients are conservatively managed, i.e., place on a rule out myocardial infarction protocol.
2. Health professional regard chest pain or discomfort with seriousness.
3. Patients admitted to the CCU in a military setting with chest pain will be placed on a rule out AMI protocol.
4. There will be a high standard for accuracy in charting with these patients.

Summary

Ischemic heart disease remains the leading cause of death in the United States. Due to the nature and difficulty of diagnosing cardiac related chest pain, the trend to conservatively treat patients with chest pain has been the rule of thumb. As coronary care units became over crowded with patients at low risk for chest pain, alternative ways to treat these patients were explored. Chest pain centers appear to be a viable alternative to admitting every patient with chest pain to a coronary care unit and have proven to be cost effective. This research is designed to investigate whether patients at low risk for an acute myocardial infarction who were admitted to a Midwest military hospital could have benefited from a chest pain center protocol and whether there would be a significant cost savings and impact on length of stay. Chapter two will discuss the current trends of utilizing chest pain center protocols in the ED, specifically addressing the utilization of these protocols and the innovations in cardiovascular technology which allows for the implementation of these accelerated protocols. Chapter three addresses the research methodology for this descriptive comparative research. Chapter four addresses the data analysis. Finally, Chapter five addresses the summary, conclusions, implications for nursing and recommendations.

II. REVIEW OF LITERATURE

This chapter will discuss the signs, symptoms and pathophysiology of an acute myocardial infarction (AMI). It will focus on the treatment of patients with low risk chest pain. It will explore the theoretical literature on traditional treatment protocols for patients admitted to the hospital for chest pain / rule out myocardial infarction and examine the current trends of fast track rule out myocardial infarction protocols utilized in chest pain centers. Empirical literature will be reviewed examining current studies regarding the treatment of low risk chest pain patients. Finally, a conceptual model will be presented and a schematic of the framework will be provided. The chapter will be split into two main areas, first, the treatment of chest pain / rule out myocardial infarction, both the conventional treatment and the fast track protocols and second, cost-effectiveness.

Acute Myocardial Infarction

An acute myocardial infarction (AMI), also known as a heart attack, coronary occlusion or just "a coronary", is a life-threatening condition characterized by areas of necrosis within the myocardium (Black & Matassarini-Jacobs, 1993). AMI usually follows the sudden occlusion of a coronary artery causing a cessation of blood flow and oxygen to portions of the myocardium. Burke and Porth (1994) report obstructed blood flow can be caused by thrombosis, ulceration and hemorrhage in an atherosclerotic

plaque, or prolonged vasospasm. It is also possible that a sudden increase in oxygen demand by the myocardium may contribute to the ischemic event.

AMI can be considered the endpoint of coronary artery disease. Unlike angina which is temporary ischemia to the myocardium, prolonged unrelieved ischemia causes irreversible damage to the myocardium (Black & Matassarini-Jacobs, 1993).

An infarct may involve the endocardium, myocardium, epicardium, or a combination of these (Burke & Porth, 1994). An intramural infarct is one that is contained within the myocardium, whereas a transmural infarct involves all three layers of the heart. Most infarcts are transmural, involving the free wall of the left ventricle and the interventricular septum. The increased vulnerability of the left ventricle is probably related to its increased work demands. About 30% to 40% of infarcts affect the right coronary, 40% to 50% affect the left anterior descending artery, and the remaining 15% to 20% affect the left circumflex artery.

Some of the most common signs and symptoms of a myocardial infarction include: pain (crushing, severe, prolonged, unrelieved by rest or nitroglycerin, often radiating to one or both arms the neck, and back); shock (systolic blood pressure below 80 mm Hg, gray facial color lethargy, cold diaphoresis, peripheral cyanosis, tachycardia or bradycardia, weak pulse); oliguria (urine flow of less than 30 ml/hr); apprehension (great fear of death, restlessness); indigestion (gas pains, nausea and vomiting); and acute pulmonary edema (sense of suffocation, dyspnea, orthopnea, gurgling and bubbling respiration) (Black & Matassarini-Jacobs, 1993). Diagnosis of an AMI is usually based on

a series of diagnostics tests to include: serial electrocardiograms, serial cardiac enzymes, echocardiography, and nuclear imaging.

Angina Pectoris

Angina pectoris is a symptomatic paroxysmal pain or pressure sensation associated with transient myocardial ischemia. The pain typically is described as constricting, squeezing, or suffocating. It usually is steady, increasing in intensity only at the onset and end of the attack. The pain of angina commonly is located in the precordial or substernal area of the chest; it is similar to myocardial infarction in that it may radiate to the left shoulder, jaw, arm or other areas of the chest. The duration of angina is brief-seldom lasting more than five minutes (Burke & Porth, 1994).

Theoretical Literature Review of Chest Pain/Rule Out Myocardial Infarction

Conventional Treatment:

Chest pain is one of the most frustrating problems for physicians working in an emergency department (Murata, 1993). The diagnostic possibilities range from a life-threatening event, such as acute myocardial infarction, to a process as trivial as muscle strain. Because it is impossible to exclude the diagnosis of myocardial infarction with certainty, physicians are often forced to admit patients who do not benefit from coronary care. Although admitting a patient lowers the risk of a malpractice claim, it also increases hospital costs, reduces the availability of monitored beds, increases the workload of house staff and increases the anxiety of patients with benign disorders (Murata, 1993).

Patients with chest pain represent a considerable legal risk for physicians working in an emergency department (Murata, 1993). In this setting, more malpractice dollars are awarded for missed myocardial infarctions than for any other physician error. Between 1974 and 1985, these losses amounted to \$5.3 million.

One unfortunate reality of the ED is undesirable outcomes. Approximately two percent to five percent of patients presenting to the ED with chest discomfort and AMI are inadvertently released home (Gibler et al., 1995). These patients may experience untoward events as the result of such a decision, including death due to arrhythmia or pump failure. Twenty percent of the malpractice dollars awarded from the practice of emergency medicine in the United States are associated with the treatment of myocardial ischemia and acute myocardial infarction (AMI).

Approximately four million patients with unexplained chest pain are evaluated yearly in emergency departments and admitted to hospitals for unexplained chest pain (Gibler, 1994). The traditional approach for treating these patients consists of serial enzymes and serial electrocardiograms in a closely monitored environment, specifically a coronary care unit. This approach provides poor utilization of health resources: 50% to 60% of emergency department chest pain patients are admitted to the hospital after an initial evaluation (Graff, 1995). Most are found to be free of cardiac disease during the hospitalization.

Until recently, physicians had little choice in the treatment of low risk chest pain patients. Because of the fear of a missed diagnosis of myocardial infarction, physicians

were forced to liberally admit these patients to coronary care units and place them on rule out myocardial infarction protocols. Several multi-center studies suggest that almost half of these admitted individuals, or two million patients annually, are eventually found to have non-cardiac causes for chest pain (Weissman, Dickinson, Dworkin, O'Neill, & Juni, 1996). The unnecessary admission of these patients to coronary care units is a time-consuming and costly exercise for the patient, physician, and hospital.

Fast Track Protocols:

As hospital budgets tightened during the 1990s, analysts looked at new ways to treat patients, yet maintain a high level of quality care. One of the frank realities was the coronary care units were over utilized, especially dealing with the admission of low risk chest pain patients (Tallon, 1996). These costly admissions were placing a huge financial burden on the health care industry, but were considered necessary due to the high risk of missing a diagnosis of myocardial infarction.

The past few decades have witnessed a decline in the fatality rate from myocardial infarctions largely because of a proliferation of cardiopulmonary resuscitation (CPR) and the development of critical care units, as well as new cardiac management techniques and medication (Snyder, 1994). The next logical step in the battle against cardiac disease is to promote early recognition of the risk factor for cardiac disease, with a dual goal of preventing ischemic attacks and bringing patients to the hospital in the early stages of a cardiac event. Most recently, several hospitals have

developed *chest pain centers* to serve as a bridge between the community and critical care services.

Patients at low probability of acute cardiac pathology constitute a considerable proportion in many coronary care units (CCUs), such that physicians should consider more effective alternatives than CCU admission "to rule out myocardial infarction," (Grijseels et al., 1995, p. 419). The fast track protocols offer a reasonable alternative to CCU admissions with an emphasis on treating the patient with chest pain that is at low risk for myocardial infarction.

Designed as a way of improving the ED evaluation of the ischemic heart disease patient, the chest pain ED (chest pain center), implies a conceptual and at times physical separation of potential cardiac patients from the flow adult emergencies (Shesser & Smith, 1994). The concept of the chest pain ED was pioneered by Dr. Raymond Bahr of St. Agnes Hospital in Baltimore, Maryland, in 1982. There are approximately 300 hospitals with chest pain EDs as of June 1993. Proponents of this new concept assert that replacement of the current ED cardiac evaluation system with formally established chest pain EDs will significantly decrease ischemic heart disease morbidity and mortality in the United States (Shesser & Smith, 1994)

Although chest pain centers may vary significantly in their structure and relationship within the ED, their goal or vision is very similar. Hospitals introducing chest pain emergency centers must have a commitment to the vision. This includes a

commitment from physicians, nurses and the institution's leadership, plus a strong financial commitment (Anderson, 1991).

For the purposes of clarification in the review of literature, fast track protocols is synonymous with chest pain centers, chest pain ED, chest pain evaluation units, and ED observation units. Each of these concepts address a new and unique way of treating the patient at low risk for acute myocardial infarction.

As a response to market demands, several hospitals began fast tracking low risk chest pain patients utilizing various protocols to fit the individual needs of the patient and the hospitals. One such program exists in a Midwest hospital, a tertiary hospital with an emergency department with 65,000 visits per year (Finefrock, 1995). In January, 1993, the ED opened a five-bed Chest Pain Evaluation Unit (CPEU) within the confines of the emergency department. The primary purposes of the CPEU are the rapid identification of patients with acute MIs and the timely administration of thrombolytic agents. Patients having acute MI can either be monitored in the CPEU or admitted to the CCU. The ED Observation Unit is an 18-bed monitored unit adjacent to the emergency department. The observation unit provides the ED physician with a third option for low-risk patients with chest pain. Use of this unit allows a short-term period of cardiac monitoring, serial measurements of cardiac enzymes and EKGs, and possible stress testing. For low-risk patients with chest pain (most patients who go to the Observation Unit are low-risk), the discharge rate is 90%.

Another example of fast tracking is a chest pain center located in southwestern Ohio, where the emphasis is placed on reducing the number of inappropriate hospital admissions for patients who are seen with chest pain (Snyder, 1994). Two private rooms have been established within the emergency department to support short-term monitoring and diagnostics and to promote rest. The area is staffed by the nurses who cover the general emergency department. Once admitted to the Heart Emergency Room, patients are immediately placed on ST-segment monitors and receive serial monitoring of cardiac isoenzymes and pain level. A disposition decision is usually made within 9 hours on the basis of results of a treadmill evaluation or echocardiography. The patient is subjected to serial CK-MB determination - on presentation to the ED and three, six, and nine hours after ED presentation (Gibler et al., 1995). After the 9-hour evaluation, if a patient has no evidence of ST-segment instability indicating evolving AMI or myocardial ischemia at rest and no serum CK-MB increase indicating myocardial necrosis, the patient is evaluated by a cardiologist who records history and performs a physical examination.

A chest pain emergency room brings together staff, equipment and treatment protocols to deliver quick, efficient care to potential heart attack victim (Anderson, 1991). Proponents argue that regardless of their effect on hospital finances, the chest pain centers, combined with aggressive public education efforts, provide a valuable public service.

Cost-effectiveness:

In 1984, the cost of inpatient hospitalization of patients with chest pain was investigated and estimated by Fineberg and colleagues (Tallon, 1996). To keep the low-risk patient in the coronary care unit would cost \$2.04 million per life saved or \$139,000 for each year of life saved. The national cost for the United States to save 145 lives would be \$297 million (Graff et al., 1992). The estimated costs are \$4,046 for the coronary care unit hospitalization, \$3,574 for an intermediate-care bed, and \$2,917 for the ward bed. Outpatient care would cost \$1,343. Outpatient care translates closely to the cost of an ED observation unit admission with a four to one cost savings when compared with coronary care unit admission. "In the United States, we are spending eight billion dollars per year to rule out myocardial infarction" (Graff et al., 1992, p. 969).

Tallon, (1996) identified three potential alternatives for a more cost-effective management of the over 500,000 patients that present to the health care delivery system with AMI. The first option involves the development of chest pain management algorithms to separate high from low risk patients. The second option rapidly identifies CCU patients at low risk for AMI for early triage to less acute hospital beds. Finally, the third option, utilizes observation units for the patient with chest pain at low risk for AMI. These short stay or "23' 59" units could serve to identify those low probability AMI patients while increasing cost effectiveness without adversely compromising quality patient care.

Empirical Literature

In a report by (Gaspoz et al., 1994), a prospective study to determine the safety and costs of a new short-stay unit for low risk patients admitted to a hospital to rule out myocardial infarction was carried out in a New England hospital. The sample size included 592 patients admitted to a short-stay coronary observation unit with a low probability of acute myocardial infarction. These patients were compared with 924 patients who were eligible for the same unit but were admitted to other hospital settings or sent home. Clinical characteristics, diagnoses and complications of patients admitted to the coronary observation unit and comparison patients were compared using chi-squared analysis with appropriate degrees of freedom for categoric variables and a *t* test for continuous variables. Unadjusted analyses of resource utilization were performed with Wilcoxon rank-sum tests and analyses of variance on the raw data and on a log-transformed scale. The rate of major complications, recurrent myocardial infarction or cardiac death during six months after the initial presentation of the 592 patients admitted to the coronary observation unit was similar to that of the 924 comparison patients before and after adjustment for clinical factors influencing triage and initial diagnoses (adjusted relative risk .86, 95% confidence interval .49 to 1.53). Their median total costs at six months (\$1,927) were significantly ($p < .0001$) lower than for comparison patients admitted to the wards (\$4,031) or to the coronary care unit (\$9,201), but higher than for comparison patients discharged home from the emergency department (\$403 before and after the some adjustments (all adjusted $p < .0001$). The data suggest that the coronary

observation unit may be a safe and cost-saving alternative to current triage strategies for patients with a low risk of acute myocardial infarction admitted from the emergency department.

Tosteson et al., (1996) reported on the cost-effectiveness of a Coronary Care Unit versus an Intermediate Care Unit for ED patients with chest pain. Data from 12,139 ED patients with acute chest pain were used in a decision-analytic model to identify cost-effective guidelines for admission to a coronary care unit versus an intermediate care unit. A subset of 901 patients was used in the baseline analysis for 55 to 64 year old patients, in which the probability of acute myocardial infarction was 29%. Triage to the CCU was somewhat more cost-effective in elderly patients because their higher early complication rate more than offset the shorter life expectancy. This analysis indicates that the coronary care unit should be reserved for patients with moderate (21% or more, depending on the patient's age) probability of AMI unless patients need intensive care for other reasons.

Along with fast track protocols, new treatment modalities are effecting the way patients at low risk for acute myocardial infarction are being treated in an ED setting. Weissman et al., (1996), reported on the cost-effectiveness of myocardial imaging with single photon emission computed tomography (SPECT) in patients presenting to the emergency department with unexplained chest pain. Fifty patients with unexplained chest pain underwent myocardial imaging with SPECT. The cardiologists' management plans before and after receipt of imaging findings were compared. Costs were determined from analysis of comparable admissions for the 6 months before the start of the test. The

cardiologists' confidence in their clinical diagnosis significantly increased with use of MP imaging ($p < .0001$). MP imaging results altered management decisions in 34 patients. Twenty-nine patients were sent home on the basis of imaging finding. None of the patients with a normal MP image experienced a serious adverse cardiac event. The total savings to the hospital was \$39,296, or \$786 per patient. The statistical validity of the physician's change in confidence level was examined with the Wilcoxon rank test. The conclusion was performing MP imaging in patients with unexplained chest pain while in the ED is cost effective.

In each of the studies by Gaspoz et al., (1994), Tosteson et al., (1996) and Weissman et al., (1996) the authors looked at cost effective alternatives to admitting patients with acute chest pain to the CCU. In the study by Gaspoz et al., (1994) the median cost for admission of low risk chest pain patients to a coronary observation unit were significantly lower (\$1,927) as opposed to patients admitted to coronary care units (\$9,201) and the rate of complication at a six month interval was similar for both the patients admitted to the coronary observation unit and those admitted to the CCU. In the study by Tosteson et al., (1996) after looking at a subset of patients 55 to 64 for comparison, it was found that the CCU should be reserved for patients with a moderate, greater than 21% probability of AMI. In the study by Weissman et al., (1996) it was determined that using single photon emission computed tomography (SPECT) in patients presenting to the ED with unexplained chest pain was cost effective. While each looked at cost effectiveness and utilization of the CCU, each study differed in the approach. In contrast, Gaspoz et al., (1994) specifically looked at the utilization of a coronary

observation room. Tosteson et al., looked at a specific age range and the probability of the patient having an acute myocardial infarction or complications. Finally, Weissman et al., looked specifically at the impact of a single therapy, SPECT, and whether it had an effect on cost-effectiveness with chest pain patients.

Conceptual Framework

Patients treated in an acute care setting for chest pain deserve quick responses from the hospital environment. Often, these responses are shaped or molded through complex organizations utilizing systems analysis. Shortell and Kaluzny (1994) view health services organizations as complex social systems. Shortell and Kaluzny maintain there is constant tension between the need for predictability, order, and efficiency on the one hand and openness, adaptability, and innovation on the other. The need for predictability, order, and efficiency is consistent with a closed system view of an organization. Shortell and Kaluzny state, "the closed system view assumes that at least parts of an organization can be sealed off from the external environment. As such, the management challenge is how to use internal design, productivity improvement tools, and incentives to maximize internal efficiency," (p. 14). When the patient arrives at the hospital, the patient can expect quality care in a timely manner. The patient can also expect some standard of therapy which has been tested and proven. In the case of a patient having chest pain, the patient can expect quick relief of chest pain, close monitoring of hemodynamic parameters, and a definitive diagnosis.

In their systems theory of health services organizations, Shortell and Kaluzny (1994), talk about the open systems view. It is consistent with the need for openness,

adaptability, and innovation. The theory emphasizes that "the organizations are parts of the external environment and, as such, must continually change and adapt to meet the challenges posed by the environment" (p. 14). The use of chest pain centers within emergency departments is an innovative idea which developed out of a need to decrease the enormous cost of hospitalizing patients with chest pain at low risk for myocardial infarction. These centers are consistent with the open systems view because they meet the criteria for openness, adaptability and innovation. As shown in Figure 1, the patient treated with conventional management for chest pain will incur higher cost and longer length of stay, whereas, the patient treated with a chest pain center protocol will incur cost savings and decreased length of stay.

In the Conceptual Model (Fig. 1), a depiction of two protocols for low risk chest pain patients is presented. In the first review (Review 1) the patient hospitalization, utilizing a conventional rule out MI protocol is costed out and length of stay is identified. In the second review (Review 2) a fast track protocol is applied to these patients identified in the audit. Similarly, each patient's hospitalization is costed out and length of stay identified but in the Review 2, the fast track protocol is retrospectively applied.

Conceptual Framework

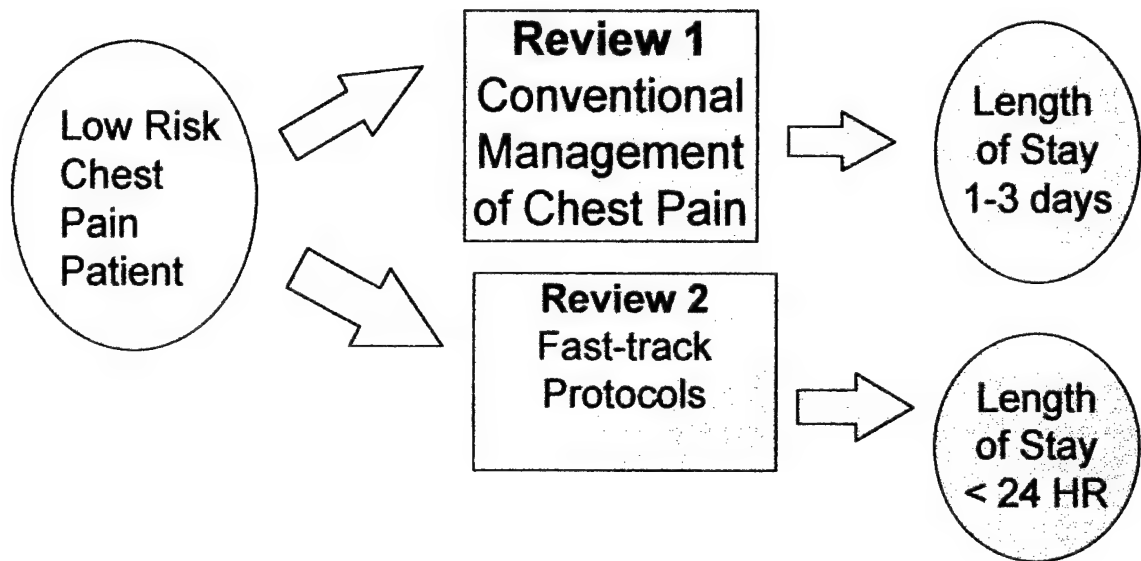


Figure 1 Conceptual Model depicting comparison of protocols for low risk chest pain (McGough, 1996)

Summary

The literature review identified, historically, the reasons for the over utilization of coronary care units. Murata (1993) discussed that physicians were forced to admit patients who do not benefit from this type of intensive care. ED physicians were in a predicament with low risk chest pain patients because it is impossible to exclude the

diagnosis of myocardial infarction with certainty. As a result of this other ethical and legal issues, the CCUs became a safe place to admit low risk chest pain patients.

The number of patients seen for chest pain each year in the United States is staggering. Gibler et al., (1994) discussed the poor utilization of health resources particularly dealing with the 50% to 60% of low risk chest pain patients admitted to CCUs of whom are found to be free of cardiac disease. Weissman et al., (1996) called the admission of low risk chest pain patients to the CCU, "unnecessary and a time-consuming and costly exercise for the patient, physician, and hospital" (p. 353).

Clearly, by the time chest pain centers were introduced and fast tract protocols for low risk chest pain patients became implemented, the health care system was ready for a dramatic change. Snyder (1994) envisioned chest pain centers as a bridge between community and critical care services. Grijseels et al., (1995) saw fast track protocols as a reasonable alternative to CCU admissions. Not only are the chest pain centers cost effective (Gibler, 1994), they have been proven to be as safe and effective as CCU admissions for low risk chest pain patient, (Gaspoz et al., 1994).

A conceptual framework was discussed in Chapter II which is based on the open systems theory of Shortell and Kaluzny, (1994) which is consistent with the need for organizational openness, adaptability, and innovation. This framework closely mirrors the goals behind the implementation of a chest pain center and fast track protocols. Chapter III will address methodology, research design, setting, population, sample, protection of human subjects and ethical considerations.

III. METHODS

The purpose of this study was, to determine through retrospective audit, if those patients at low risk for AMI who were admitted to the CCU over a one year period, would have potentially benefited from the use of a chest pain center protocol to rule out AMI and to determine if decreasing the length of stay through use of this protocol would be a cost benefit. Currently, no such protocols are utilized in the military setting. However, recent literature supports the concept of chest pain centers for relief of the costly over utilization of the CCU and for patients with chest pain but at low risk for acute myocardial infarction. Although the chest pain center phenomena is relatively new and research on the subject is scarce, the existing research clearly indicates a margin of cost-benefit for the identified group.

This chapter addresses the methodology, research design, setting, population, sample, protection of human subjects and ethical considerations, along with protocols for data collection and data analysis. The chapter will conclude with a summary.

Research Design

This study will used a retrospective comparative descriptive design. A comparative descriptive design examines and describes differences in variables in two or more groups that occur naturally in the setting. An advantage to this design is that it leads to an interpretation of the theoretical meaning of the findings and provides knowledge of

the variables and the population that can be used for future research in the area (Burns & Grove, 1993). In this design, the dependent variables of cost and length of stay are evaluated by applying comparative variables from other settings.

Research Setting

The research was conducted in a 301 bed military hospital located in the Midwestern United States. The hospital is a full service medical center with both inpatient and outpatient services. Patients from the selected sample were previously admitted to the Coronary Care Unit, one of three adult intensive care units within the facility. The hospital is one of six major Air Force hospitals that provide care for the active duty, dependent and retired military populations. The military hospital was chosen specifically for this research because chest pain centers are not presently utilized in this setting or throughout the Air Force.

Population

The patients entered into this study were treated at a Midwestern military hospital. The patients come from a 100 mile radius of the hospital's catchment area. Over 400,000 patients are identified as part of the patient population for the Midwestern military hospital, of which, 97,000 were active duty, 267,000 were active duty dependents, 103,000 were retirees and 76,000 were over 65 years of age.

The target population consists of charts of patients previously admitted to the CCU with chest pain for a rule out myocardial infarction protocol who were a low risk for AMI. According to the military hospital, CCU Patient Log book, over 900 patients are

seen annually in this CCU. Both males and females were included in the sampling. All patients were either active or retired military or dependents of military.

Sampling Plan

This study used a convenience sample. A convenience sample is a type of nonprobability sample. Convenience samples are inexpensive, accessible, and usually require less time to acquire than other types of samples. The most significant limit of this type of sample is that it may not be representative of the population and therefore results can not be generalized beyond the sample (Burns & Grove, 1993). A power analysis was performed by the Statistical Consulting Center of Wright State University using power analysis software called PASS, Version 6.0. The power analysis indicated that in order to detect a medium effect size difference between protocols of 0.36 standard deviations in cost or length of stay with 80% power, a sample size of 50 was needed. These estimates were based on a level of significance of 0.05. "The effect size must be determined in order to perform a power analysis for the purpose of determining sample size. Effect size is the extent to which the null hypothesis is false. This power level results in a 20% chance of a Type II error in which the study fails to detect existing effects (differences or relations)" (Burns & Grove, 1993, p. 247-248).

Convenience sampling was used to select the first 50 patients that met the inclusion criteria. Because the day of the month has no bearing on the patient, the first 10 patients with an admission diagnosis of rule out myocardial infarction for 12 consecutive

month were requested for review. Of those, the first 50 which met the exclusionary criteria were included in the study.

The exclusionary criteria used for sampling was similar to the general guidelines for admission to the short-stay coronary observation unit reported by Gaspoz et al., (1994). These include: 1) absence of significant cardiac history; and 2) the absence of all of the following: acute ischemia or infarction on the emergency department electrocardiogram (ECG); ventricular couplets or bigeminy, paroxysmal supraventricular tachycardia or arrhythmias requiring intravenous treatment; second- or third-degrees atrioventricular block or new bundle branch block; persistent or recurrent ischemic pain after initial treatment in the emergency department or need for intravenous nitroglycerin; systolic blood pressure >200 mm Hg or <100 mm Hg or diastolic blood pressure >120 mm Hg; congestive heart failure and conditions requiring intravenous medication or more than the available nursing care.

Ethical Considerations/Protection of Human Subjects

Permission to conduct the study was obtained from the study site (Appendix A), from the Wright State University Institutional Review Board (Appendix B) and from the Agency Internal Review (Appendix C). Researchers have a responsibility to protect the rights of human participants in their research studies (Burns & Grove, 1993). The study involved a retrospective chart audit. Neither the patient's name nor identification number were used. The confidentiality of the subjects was protected. Each subject was given a code number. A master list of the subjects' names and code numbers was kept in a locked

drawer accessible to only the investigator. Data collected were placed on data collection sheets and a computer floppy disk. Upon completion of this study, all data including computer disk were destroyed. No data were entered onto a computer hard drive. The researcher, statistician, and thesis chairperson were the only people to have access to this data. Charts were identified during the research by their hospital identification number but were coded for the purposes of the research. Coding sheets remained under lock and key in the principle researcher desk at home until the research was completed. Upon request, the coding sheets were accessible to the chair and the statistician. The coding sheets were destroyed thereafter. No human subjects were contacted for this study.

Data Collection Instrument

Data for this study were collected on a data collection sheet using a low risk for myocardial infarction profile developed by Gaspoz et al., (1994), (Appendix D). The data collection tool, developed by this researcher, is an exclusionary tool which uses 10 medical criteria identified by Gaspoz et al., (1994), which would exclude the patient from being at low risk for chest pain. The data are checked on a dichotomous yes/no scale. Using a convenience sample, fifty patients were identified as meeting the criteria for low risk for AMI. The data collection tool contents were reviewed by three doctorally prepared faculty with expertise in cardiology. The data collection tool will be referred to as (CPLR) chest pain with low risk for myocardial infarction. In order for a patient to meet the low risk chest pain criteria, a perfect score must be obtained on the data collection tool. Each question has one answer, i.e., yes or no. The first six questions must

be answered *yes* and the last four questions must be answered *no*. If all of the questions were answer correctly then the patient's chart was included in the research. Because the data collection tool is a nominal dichotomous checklist, instrument reliability cannot be established.

Methods/Procedures

The researcher obtained permission to do this study from the Thesis Committee, Wright State University IRB and the Nursing Research Function and Clinical Investigations Department at this military hospital. The researcher established a time frame with the inpatient records department for data collection. The researcher requested from the CCU Nurse Manager the CCU Patient Log for the year 1995. Year 1995, was selected because it had a larger sample size of rule out MI patients available. The CCU patient logs are kept in a file cabinet in the CCU nursing station. A list of all patients admitted to the CCU on a rule out myocardial infarction admission diagnosis was obtained and their hospital numbers were transcribed onto Air Force Form 250 (Health Record Charge Out Request). A total of 120 request slips (ten from each of the twelve months) were completed and turned into the inpatient medical records department for request. Personnel from the inpatient records department pulled the requested records for review and the records were placed on one of four review desks within the medical records department. All records were reviewed at the review desk and at no time did the record leave the area. The first fifty charts which met the exclusionary criteria were entered into the study. Data collected were transcribed on the data collection sheets. The

data collection sheets were the only materials which left the inpatient records department. These sheets remained under lock and key in a desk at the researcher's home and were accessible to the chair and statistician upon request. The researcher then collated findings of the chart review with the Resource Management Office in order to perform a cost-benefit analysis. The chest pain center protocol was costed out, then each of the 50 patients were costed out in terms of a typical CCU admission using average bed day costs, obtained by E. O'Brien, Biostatistician and T. Best, Third Party Collection Agent. Complete confidentiality was maintained at all times using a code sheet.

Data Analysis

Data analysis was performed to identify the comparison between the conventional rule out myocardial infarction protocol and the fast track chest pain center protocol. The same group of patients were used during the analysis, however, each was put through both criteria; the conventional rule out protocol and the fast track protocol. Fifty patients who met the low risk chest pain criteria of Gaspoz et al., (1994) were placed into a cost-benefit analysis to determine cost savings and difference in length of stay if these patients were admitted to a chest pain center. Demographics included the age and gender of the patient, as well as, the mean, median, and mode as determined by the measures of central tendencies with regard to cost and length of stay. The analysis includes the cost of a similar stay in a chest pain center to include those definitive tests reported by Gibler et al., (1995) in their study. These definitive tests utilized by Gibler et al., include the following: serial testing for creatine kinase (CK-MB) on presentation and at 3, 6, and 9

hours; continuous 12-lead ECGs/serial ST-segment trend monitoring for 9 hours; two-dimensional echocardiography and a graded exercise stress test. The cost analysis also included the typical Emergency Department charge as computed by the Resource Management office of the Midwestern military hospital. Although, charges for hospitalization are not typically computed for military and their dependents, the Resource Management office can give a good estimate of these charges.

The following research questions were addressed for data analysis: **1) What is the difference in length of stay between patients at low risk for AMI using chest pain center protocols and patients at low risk for AMI using conventional protocols?** This question was addressed using a Wilcoxon signed rank test on the difference between the conventional length of stay and fast-track length of stay; **2) What is the difference in cost for low risk AMI patients using conventional protocols versus chest pain center protocols?** This question was addressed using the Wilcoxon signed rank test on the difference between conventional hospital cost and a fast-track hospital cost. Data analysis for the three research questions were conducted using SAS Version 6.11, with a level of significance of .05.

Summary

The purpose of this study was to determine if the utilization of chest pain center protocols in a military setting is cost effective and will decrease length of stay for those patients at low risk for AMI. The study used a retrospective chart review to sample 50 low risk chest pain patients whom previously were ruled out for myocardial infarction in

a six bed coronary care unit, part of a 301 bed military medical center located in the Midwest. The study compared and contrasted the results of the standard rule out protocol which was used for these patients against chest pain center indicators used in the civilian setting. A significant cost savings and decrease in length of stay should be identified had these selected patients been treated with chest pain center protocols. A ten item tool CPLR was utilized to determine if the patients meets the low risk criteria. A fast track protocol similar to one used in a large civilian medical center in the Midwest was used to cost out the hospitalization had these patients utilized a fast track protocol. Specific data analysis will be discussed in chapter four.

IV. ANALYSIS OF DATA

The use of chest pain center protocols has gained wide acceptance in the civilian hospital setting. Currently, chest pain center protocols are not utilized in the military hospitals. It is not known if the use of fast-track protocols will significantly decrease costs and length of stay for patients at low risk for AMI in a military setting. A retrospective chart audit was performed to obtain the 50 patients who met the exclusionary criteria for chest pain.

This chapter provides an analysis of the data collected. Descriptive statistics and tables which are relevant to the research questions are included.

Description of the sample

The sample in this study was taken from patients admitted to the CCU in a Midwestern military hospital with a diagnosis of rule out myocardial infarction. Of the 120 records requested for audit, 96 were available for review. Of the 96 records audited, 50 (52%) met the exclusionary criteria and were included in the study. The exclusionary criteria was developed by Gaspoz et al., (1995) and consisted of ten questions. All ten questions must be answered correctly in order for the patient to be included in the study. The first six questions must be answered with a "yes". They are as follows: 1) absence of significant documented cardiac history, 2) absence of acute ischemia or infarction on ED ECG, 3) absence of ventricular couplets or bigeminy in ED, 4) absence of PSVT or

arrhythmias requiring IV treatment, 5) absence of 2nd or 3rd Degree A-V Block or new BBB, 6) Absence of persistent or recurrent ischemia after initial ED TX. Questions seven through ten must be answered with a "no". They are as follows: 7) need for intravenous nitroglycerin in ED, 8) systolic blood pressure > 200mm Hg or < 100mm Hg, 9) diastolic blood pressure > 120mm Hg, 10) congestive heart failure or conditions requiring IV medications. Of the 96 records audited, 46 (48%) did not meet the exclusionary criteria and had one or more wrong answers for the ten question criteria. Twenty-eight (61%) of the 46 charts which failed to be included in the study had significant prior cardiac history, such as having a previous MI or congestive heart failure. Twelve (26%) of the 46 were not included in the study because they received intravenous nitroglycerin in the ED. Three (6%) were not included because of acute ischemia in the ED. Two (4%) were not included because of atrial dysrhythmias in the ED. One (2%) was not included because of high systolic blood pressure.(Table 1).

The demographics showed that of the 50 subjects included in the study, 29 (58%) were male and 21 (42%) were female. The ages ranged from 35-71 years with the mean of 53.22 years and a standard deviation of 9.99. The median was 53.5. Of the 50 patients included in the study, 3 (6%) had an MI even though these subjects met initial exclusionary criteria.

For the 50 patients included in the study, the LOS ranged from one - five days in both CCU and Telemetry beds. Each bed day was costed out by the Resource Management Office. The cost of a CCU bed day was \$1632.72 and the cost of a

Telemetry bed day was \$501.76. The costs were rounded to the whole dollar for purposes of data analysis. (Table 2 displays the breakdown of costs).

Table 1

Exclusionary Criteria for Low Risk MI

(n=96)

item	YES		NO	
	n	%	n	%
Absence of Cardiac Hx	68 *	71	28	29
Absence of acute ischemia	93 *	97	3	3
Absence of Vent Arrhythmias	96 *	100	0	0
Absence of PSVT requiring IV	94 *	98	2	2
Absence of 2nd and 3rd Degree HB	96 *	100	0	0
Absence of ischemia after ED TX	74 *	77	12	13
Need for IV Nitroglycerin in ED	12	13	74 *	77
Systolic BP >200mmHg	1	1	95 *	99
Diastolic BP >120mm Hg	0	0	96 *	100
Congestive Heart Failure in ED	0	0	96 *	100

Note. * indicate inclusion into study

The first six questions had to be answered, "yes", and the last four questions had to be answered "no" for the patient to be considered at low risk for AMI and be entered into the study.

Table 2**Cost of Conventional Hospitalization for CCU and Telemetry Bed Days****(n=50)**

Length of Stay					
n	%	CCU*	TELE**	TOTAL	COST \$
4	8	1		1	1632
9	18	1	1	2	2133
1	2	1	2	3	2634
27	54	2		2	3262
6	12	2	1	3	3764
1	2	3		3	4896
1	2	2	3	5	5896
1	2	4	1	5	7029

* Cost 1632/day

** Cost 501/day

Note! The cost calculated for each patient was based on actual number of days in each unit.

The cost of hospitalization and length of stay data were run for frequencies and frequency percentages for the 50 patient charts that were entered into the study. The cost range for conventional hospitalization, of which both bed days for CCU and telemetry were considered, ranged from \$1632 to \$7,029 depending on the number of bed days accumulated by each patient. This was calculated using the costs of bed days for

CCU and Telemetry. No patients in the study were admitted directly to Telemetry, therefore the lowest cost in the study was one CCU bed day at \$1632. (Table 2). There were a total of four patients at a cost of \$1632 and one patient at a cost of \$7,029. The most frequently occurring cost was \$3, 262, (n = 26).

Length of stay frequencies for conventional hospitalization ranged from one bed day to five. Of the 50 patient charts entered into the study, there were three patients (6%), admitted for one bed day and two patients (4%) admitted for five bed days. The most frequently occurring bed day was two bed days of which there were 37 patients (74%).

Research Question #1: What is the difference in length of stay between patients at low risk for AMI using chest pain center protocols and patients at low risk for AMI using conventional protocols? A Wilcoxon signed rank test on the difference between the conventional length of stay and a fast-track length of stay of one day for each patient was conducted. Wilcoxon signed rank test was used instead of t-test since length of stay and hospital cost are not normally distributed variables (an assumption of the t-test) and the Wilcoxon signed rank test, a nonparametric test, does not rely on any distributional assumptions Chaney, (1997). The results indicate that the conventional length of stay had a mean LOS of 2.22 (SD = .736) is significantly longer than the fast-track length of stay (<1) if each patient's length were one day using fast-track protocols ($T = 564$, $p = .0001$). The mean difference in length of stay is 1.22 days (SD = .736).

Research Question #2: What is the difference in cost for low risk AMI patients using conventional protocols versus chest pain center protocols? A Wilcoxon signed rank

test on the difference between the conventional hospital cost and a fast-track cost of \$847 for each patient was conducted. The cost of the fast track was determined by costing out each test as determined by Gibler et al., (1995) and then adding the costs for a total cost (Appendix E). The results of the Wilcoxon signed rank test indicate that the mean conventional cost of \$3137.20 (SD = 979.94) (cost of bed days for CCU and Telemetry determined by Resource Management Office) is significantly higher than the fast-track cost if each patient's cost were \$847 using fast-track protocols ($T = 637.5$, $p = .0001$). The difference in costs is \$2290.20.

Summary

The sample included more males (29 or 58%) than females (21 or 42%). The mean age for the 50 subjects in the study was 53.22 with a SD of 9.99. The range was from 35-71 years of age spanning 36 years. The LOS mean for the 50 included in the study was 2.22 with SD of .736. The range was 1-5 days with a span of 4 days. The mean cost was \$3137 for the conventional hospitalization with a SD of 979.94. The range was \$1632-\$7029.

For LOS, the results of the Wilcoxon indicate that a conventional length of stay was significantly longer than the fast-track length of stay if each patient's length of stay were one day using fast-track protocols ($T = 564$, $p = .0001$). The mean difference in LOS is 1.22 days.

For cost, the results of the Wilcoxon indicate that the conventional cost are significantly higher than the fact-track cost if each patient's cost were \$847 using the fast-track protocols ($T=637.5$, $p = .0001$). The difference in costs is \$2290.

In the following chapter, the conclusions, implications, and recommendations will be discussed. Limitations to the study will also be reviewed.

CHAPTER V.

SUMMARY, CONCLUSIONS, IMPLICATIONS AND RECOMMENDATIONS

This final chapter will summarize the thesis. The purpose of the study, summary of protocols and demographics are discussed. Then each research question and it's finding are addressed. Implications for nursing, including nursing practice, education and nursing administration are discussed, as well as, limitations of the study. Finally, recommendations for future studies in nursing research are made.

Summary

The evaluation of acute chest pain in the ED had been recognized as problematic, (Jesse & Kontos, 1997). Several studies published in the late 1970s and the 1980s reported a relatively high frequency with which patients with myocardial infarction were discharged inadvertently from EDs. This prompted efforts to improve diagnostic accuracy, including new tests, techniques and evaluation protocols. Increased recognition of the prevalence of missed MIs and the associated high litigation potential also led to an increase in the number of patients at lower risk for possible MI, to be admitted to expensive intensive care beds. The result is that the proportion of patients admitted to CCUs who actually rule in for an MI is in some cases now reported to be less than 20% (Karlson, Herlitz & Wiklund, 1991).

Fast-track protocols are utilized to determine in less than 24 hours what it use to take one to three days to discover. Protocol-driven assessment in a short stay observation unit can safely risk stratify patients with an intermediate likelihood of ischemic heart disease at half the cost of hospitalization, (O'Rourke, 1997). Chest pain centers, usually adjacent to the hospital's ED, have spread throughout the United States during the past ten years.

The use of fast-track protocols, although widely accepted in the civilian setting, are not currently used in the military hospitals. The purpose of this study was through a retrospective chart audit, to determine if those patients who were at low risk for acute myocardial infarction and were admitted to the CCU in a Midwestern military hospital, would: 1) benefit from the use of a chest pain center protocol to rule out MI, and 2) decrease cost and LOS if a fast track protocol was used.

The fast track protocol selected for this study came from a Midwestern university hospital. It consisted of the use of accelerated cardiac enzyme and ECG testing, along with several other definitive test including; echocardiography, exercise stress test and cardiology consultation (see Appendix E). The protocol was costed out at the military hospital and the LOS for the purposes of the study was one day. The fast-track protocol was applied retrospectively as a dummy protocol to each of the 50 patient charts entered into the study.

After receiving approval from the internal review boards at Wright State University and the Midwestern military hospital, data collection was begun. First, the

CCU Patient Log Book was reviewed and the year 1995 was selected because it had more rule out MI patients admitted than 1996. The first 10 patients with an admission diagnosis of “rule out MI” was identified. A total of 120 charts were requested for review in the Inpatient Records Department of the hospital. Of the 120 charts requested, 96 were available for review. Utilizing the exclusionary criteria on the Data Collection tool, 50 charts met the criteria and were selected for the study.

The demographics showed that of the 50 subjects included in the study, there were more males than females. These subjects are not similar to the general chest pain population that shows little or no gender bias. This may be due to the fact that there are more men than women in the military. Johnson et al. studied 1411 men and women evaluated for chest pain in the ED. The mean age and number of risk factors were similar between the two genders, although men were more likely to have a history of coronary disease, (Jesse & Kontos, 1997).

Conclusions

For a conceptual framework, this study used the “open systems theory” of Shortell and Kaluzny (1994). In the theory, the authors discuss the need for openness, adaptability and innovation. The use of fast-track protocols is consistent with the conceptual framework in that they resemble the approach toward openness, adaptability and innovation. This view of openness, emphasizes that organizations are parts of the external environment and must continually change and adapt to meet the challenges posed by the environment. The chest pain centers and fast-track protocols are the

healthcare's systems answer to the changing environment and the introduction of managed healthcare.

This study looked at two research questions, each will be discussed. The first is; **What is the difference in length of stay between patients at low risk for AMI using chest pain center protocols and patients at low risk for AMI using conventional protocols?** The study showed there was a significant difference between the two protocols. A Wilcoxon signed rank test on the difference between the conventional length of stay and a fast-track length of stay of one day for each patient was performed. The results indicated that the conventional length of stay was significantly longer than the fast-track length if each patient's length of stay were one day using fast-track protocols. The mean difference in LOS was 1.22 days. These findings are consistent with similar findings on LOS using fast track protocols or guidelines. Weingarten et al., (1994) reported that dissemination of a guideline to promote a shorter length of stay for patients at low risk admitted with chest pain could significantly reduce hospitalization from 2.5 to 2.0 days. In a second study, Finefrock, (1995) reports that in low-risk patients with chest pain, the discharge rate from their 12-18 hour protocol for observation in a Midwestern hospital is 90%. In a third study, Gibler et al., (1995) evaluated 1010 patients with chest pain at low risk in a Midwestern hospital; 839 (82%) patients were discharged home after a 9-hour observation protocol. This observation protocol for patients at low risk appears to be a safe and effective alternative to the traditional CCU admission of all patients with chest pain. It clearly reduces LOS and cost in this select group of patients. The second

research question is; **What is the difference in cost for low risk AMI patients using conventional protocols versus chest pain center protocols?** A Wilcoxon signed rank test on the difference between the conventional hospital cost and a fast-track cost of \$847 for each patient was completed. The results of the test indicate that the conventional cost (cost of bed days for CCU and Telemetry determined by Resource Management Office) is significantly higher than the fast-track cost if each patient's cost were \$847 using fast-track protocols. These findings are consistent with several other studies. Gaspoz et al., (1994) compared 592 patients admitted to a chest pain evaluation unit (CPEU) with 924 patients who were eligible for the unit but who were instead admitted to other hospital units or discharged home. The rate of major complications was similar in the two groups. However, the median costs at 6 months were significantly lower in the CPEU patient (\$1455) compared with admission to medical ward (\$4712), step-down (\$4031), or the CCU (\$9201). In another study, Gomez et al., directed 100 low-risk patients to either an ED-based rapid rule-out protocol ($n = 50$) or to routine hospital care ($n = 50$). The charges to rule out ischemia at 30 days were significantly less in the protocol group (\$1237) versus the standard-care group (\$2253), leading the authors to conclude that the protocol was more cost-effective than routine hospital care.

Discussions

Until recently, the hospitalization costs, in a military setting were not tracked to the dollar. Now it is possible to determine the cost of a bed day for the wards and intensive care units. The cost of the fast-track protocol was based solely on the

procedures themselves and may not reflect true ED costs because there is a fixed, one time cost for the ED in this military hospital. With regard to conventional versus fast-track cost, the skewness of 1.448 for cost of stay may be attributed to the difficulty in costing out the hospitalization of a patient in a military hospital.

With regard to the costs for fast-track versus conventional hospitalization, there appears a wide variance in dollars between the two protocols. This could be attributable to the fact that the fast track protocol is basically an outpatient protocol in which the patient is kept in the ED for up to 23 hours and 59 minutes so as not to admit the patient to the hospital. The theory behind the protocol requires that all the tests be completed in less than 24 hours. In the conventional protocol, the patient is admitted to a CCU bed and either discharged from the CCU or transferred to a ward bed upon ruling out for AMI. The frequency of the cost of \$3262 is attributable to the number of patients that are discharged on day two.

There was a wide disparity between fast-track length of stay and conventional length of stay. Of the 50 patients entered into the study, the majority had an LOS of 2 days in the conventional setting whereas all had a LOS of one day in the fast-track protocol. This is an assumption on the researchers part when entering the patients into a dummy fast-track. In reality, there may be several of these patients that were selected for admission to the CCU for one reason or the other during the fast-track protocol. Base on the literature and the researcher's findings, fast-track protocols for patients determined to be at low risk for acute myocardial infarction appear to be a cost-effective alternative to

the conventional CCU hospitalization of these patients. The research has clearly shown a significant decrease in the cost and LOS for these patients. The question to be answer is will this cost-effectiveness carry over for each hospital situation. In all probability, these protocols will only be useful and effective in hospitals that have a high frequencies of chest pain admissions to the ED. Further research on this subject is definitely warranted.

Implications

The practice of nursing should be based on knowledge generated through research. Thus, clinical practice is an extremely important source of research problems, (Burns & Grove, 1993). This study was primarily concerned with clinical practice, specifically the treatment of low risk chest pain patients in a clinical setting. The results of this study, as with many studies like it, clearly demonstrate the impact cost of hospitalization and indirectly LOS have on nursing practice. If the current trend is toward the utilization of chest pain centers to treat low risk chest pain patients, the implications for nursing are tremendous. Jesse and Kontos, (1997) report there has been a proliferation of CPEUs over the past decade with the estimated 1600 operating in 1995 projected to increase to 6400 by 1997. As such, nursing practice will be effected, especially in the areas of clinical practice, nursing education, and nursing administration.

The idea that most of the low risk chest pain patients will eventually rule out for MI changes the way the patient needs to be cared for. The low risk chest pain patient in a chest pain center, will now be put through a battery of serial tests in the ED and will only be transferred to the CCU if there is indication that the patient is having myocardial

ischemia. Therefore, more chest pain patients will be cared for by emergency room nurses for longer periods of time. The emergency room nurse that works in the chest pain center or with the fast-track protocols for chest pain patients, will need to be comfortable with the various tests performed during this accelerated protocol. This will mean specialize education to include use of monitors, thrombolytics, and knowledge of different tests such as echocardiograms and exercise stress tests. The nurse will need to feel comfortable in patient education, discharge planning, and follow-up. Nursing education departments must focus on the impact of these new strategies to improve cost-effectiveness and length of stay.

Ward and Price (1993) wrote, scientific and technological advances in health care have dramatically influenced the delivery pattern of nursing services. The goal of the nurse administrator is to orchestrate human and technological resources to create an environment that enhances the practice of professional nursing. The environment is rapidly changing and it is essential that nursing seize the opportunity to capitalize on this unstable environment in order to further the nursing profession through research and education.

Nurse managers must develop programs along the continuum of care which enable the nurse to participate in this new healthcare environment. The development of these programs not only impact the nurse managers who implement and manage the programs but impacts nurse educators, nurse administrators, as well as nursing practice.

In the case of the chest pain center, the implications for a nurse run center of excellence is a reality. Finefrock (1995) describes a chest pain evaluation unit in the Midwest that is nurse managed and clearly successful. Of the patients seen for chest pain, 29 % are admitted, 58 % are observed and 13 % are discharged to home. This nurse run unit prides themselves on their patient teaching and 3-day follow up. Further research with regards to outcomes and cost is necessary.

There are several implications for the military hospital. A nurse managed chest pain center within the ED of a large military hospital would clearly benefit the patients and create a significant cost saving for the facility through decreasing length of stay. CCU beds will be freed for true cardiac emergencies which in effect decreasing the number of patients disengaged to a civilian facility because the CCU was closed for admission. Chest pain patients will be monitored more closely by a team of nurses and physicians specifically trained for the chest pain center. Patients will benefit from shorter hospitalization and definitive answers in a shorter period of time.

Limitations of Study

1. All charts reviewed were from the same hospital and therefore were a homogenous sample.
2. The use of a dummy fast-track skews the results.
3. All 50 charts that met the exclusionary criteria were enter into the dummy fast track and given a one day LOS. In reality, there is a portion of those patients which may exhibit problems requiring an admission to the hospital.

4. Because the data collection tool is a nominal dichotomous checklist, instrument reliability cannot be established.
5. A methodological limitation was that findings of convenience samples are not generalizable to another setting.
6. Another methodological limitation was that the research involved a single setting and is therefore not generalizable.
7. Because the chart review process was a potential limitation due to limited control over data collection, it was decided to request a larger number of charts initially, in the event a chart was not available. This action proved necessary because of the 120 charts requested, only 96 charts were available for review.

Recommendations

1. Further research into the area of fast track protocols in a military hospital setting will enable nurse administrators to determine the cost effectiveness, impact on patient acuity, census and nursing hours. It is recommended that this study be replicated in other military settings so that the results can be generalized further to other military hospitals.
2. A pilot study would definitely benefit the research, in this area, because patients could be entered into a realistic fact-track protocol. This would be beneficial to the military because it would more accurately reflect the true patient condition.
3. Future studies should include a wider range of patients to be evaluated. This study involved a fairly homogenous sample.

4. Future studies in the military setting should concentrate early on the cost of hospitalization and the costing out of bed days and protocols. Now that the cost of hospitalization is a high priority in the military setting, future studies may more accurately reflect these statistics.
5. This researcher recommends that more nursing research in both the civilian setting and military setting be accomplished with regards to chest pain centers and fast-track protocols. To date, the researcher found only one nursing study on this subject and that was by Finefrock dealing with a nurse run observation unit.

Final Summary

The purpose of this study was to determine if a fast-track protocol for patients with chest pain at low risk for AMI was a cost and LOS saving as compared to conventional hospitalization. The statistics for the 50 patient charts entered into the study showed that fast track protocols significantly impact cost and LOS.

The conclusions were discussed in relation to the review of the literature, both theoretical and empirical. The conceptual framework, "open systems theory" of Shortell and Kaluzny was adapted to the conceptual model. Limitations of the study along with implications to nursing were also discussed. Further nursing research with regards to fast track protocols and the use of chest pain centers must be undertaken. Review of the literature revealed the obvious need for further nursing research into the cost-effectiveness and impact on LOS that these new programs offer.

Appendix A
Agency Permission for Conducting Study

Wright State University-Miami Valley
College of Nursing and Health
AGENCY PERMISSION FOR CONDUCTING STUDY

THE 74th Medical Group Wright Patterson Air Force Base

GRANTS TO Paul D. McGough

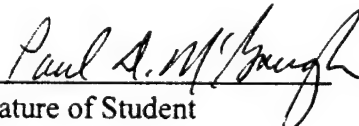
a student enrolled in a program of nursing leading to a Master's degree at Wright State University, the privilege of using its facilities in order to study the following problem:
The length of stay and costs of hospitalizing patients at low risk for acute myocardial infarct as compared to their civilian counterpart treated in Chest Pain Centers.

The conditions mutually agreed upon are as follows:

1. The agency (may) (may not) be identified in the final report.
2. The names of consultative or administrative personnel in the agency (may) (may not) be identified in the final report.
3. The agency (wants) (does not want) a conference with the student when the report is completed.
4. Other: Will need progress reports on a yearly basis + final report when study is complete

Date: MAY 22 1997


Signature of Agency Personnel/Title


Signature of Student

Signature of Faculty Director

Appendix B
Wright State University
Internal Review Board Approval



**Wright State
University**

Research and
Sponsored Programs
3640 Colonel Glenn Hwy.
Dayton, OH 45435-0001
(937) 775-2425
FAX (937) 775-3781
e-mail: rsp@wright.edu

DATE: April 3, 1997

TO: Paul D. McGough, P.I., Student
Mary Stoeckle, Ph.D., Faculty Advisor
College Of Nursing & Health

FROM: Robyn Simmons, Sponsored Programs Assistant
Secretary, WSU Institutional Review Board

SUBJECT: SC# 1844

*Conservative Versus Fast Track Rule Out Myocardial Infarction Protocols:
A Cost And Length Of Stay Comparison With Low Risk Chest Pain
Patients In A Military Hospital*

The above human subjects study was approved by the Screening Committee on the condition that you respond to the Committee's comments. **Please note that the activities covered by this action may not be initiated until your responses to these conditions have been received and accepted.**

In order for us to remove the conditions, would you please respond by sending a cover letter explaining the additions or changes along with a copy of any revised pages and/or consent document (with changes highlighted) as indicated.

Send your response to Robyn Simmons, Secretary to the Institutional Review Board, 122 Allyn Hall.

If you have any questions concerning the condition(s), please contact me at 775-2425.

Thank you!

/rds

Enclosures

RESEARCH INVOLVING HUMAN SUBJECTS

SC# 1844

Original Review X

Continuing Review _____

ACTION OF THE WRIGHT STATE UNIVERSITY
SCREENING COMMITTEE
Assurance Number: M-1021-01

Title: *Conservative Versus Fast Track Rule Out Myocardial Infarction Protocols: A Cost And Length Of Stay Comparison With Low Risk Chest Pain Patients In A Military Hospital*

Contract No.

Principal Investigator: Paul D. McGough, P.L. Student
Mary Stoeckle, Ph.D., Faculty Advisor
Department: College Of Nursing & Health

The Institutional Review Board named above has taken the following action with regard to the use of human subjects on this proposed project:

_____ Approved

X Approved pending receipt of the items listed **

The conditions, if any, are attached and are signed by the Committee Chairer. If disapproved, the reasons are attached and are signed by the Committee Chairer and by other consultants, if any.

REMINDER: FDA regulations require prompt reporting to the IRB of any changes in research activity, changes in approved research during the approval period may not be initiated without IRB review (submission of an amendment), and prompt reporting of any unanticipated problems (adverse events).

Eugene P. Kern
Signed _____ Coordinator, WSU-IRB

Date: March 21, 1997

This approval is effective only through: March 21, 1998

This activity may be initiated only after any restrictions that may have been placed on this study by the Board have been addressed and removed. To continue the activities approved under this protocol you should receive the appropriate form(s) from Research and Sponsored Programs (RSP) two to three months prior to the required due date. If you do not receive this notification, please contact RSP at 775-2425.

SC#1844
March 28, 1997

Paul D. MGough, P.I. (Student)
Mary Stoeckle, Ph.D. (Faculty Advisor)

PLEASE RESPOND:

***NOTE:** *When responding, please Hi-lite the requested changes made to your revised document(s) . Unless otherwise noted, only one (1) copy of the requested item(s) need be submitted for your response.*

Please be aware that the activities covered by this action may not be initiated until all conditions have been removed and subsequent final approval has been recommended.

*The Committee recommended the retrospective record review for Expedited Review provided the following conditions are met:

- a. Clarify that the data being reviewed has been recorded prior to April 1, 1997.
- b. Provide a copy of the data collection tool and the inclusion/exclusion criteria.
- c. Receipt, when available, of a letter of permission from the individual(s) having responsibility for the records being reviewed.



**Wright State
University**

Research and
Sponsored Programs
3640 Colonel Glenn Hwy.
Dayton, OH 45435-0001
(937) 775-2425
FAX (937) 775-3781
e-mail: rsp@wright.edu

DATE: April 15, 1997

TO: Paul D. McGough, P.I., Student
Mary Stoeckle, Ph.D., Faculty Advisor
College Of Nursing & Health

FROM: Robyn Simmons, Sponsored Programs Assistant
Secretary, WSU Institutional Review Board

RDS

SUBJECT: SC# 1844

*Conservative Versus Fast Track Rule Out Myocardial Infarction
Protocols: A Cost And Length Of Stay Comparison With Low
Risk Chest Pain Patients In A Military Hospital*

This memo is to verify the receipt and acceptance of your response to the conditions placed on the above referenced human subjects protocol/amendment.

These conditions were lifted on: April 15, 1997

This study/amendment now has full approval and you are free to begin the research project. This implies the following:

1. That this approval is for one year from the approval date shown on the Action Form and if it extends beyond this period a request for an extension is required. (Also see expiration date on the Action Form)
2. That a progress report must be submitted before an extension of the approved one-year period can be granted.
3. That any change in the protocol must be approved by the IRB; otherwise approval is terminated.

If you have any questions concerning the condition(s), please contact me at 775-2425.

Thank you!

/rds

Enclosure

Original Review X

Continuing Review _____

ACTION OF THE WRIGHT STATE UNIVERSITY
SCREENING COMMITTEE
Assurance Number: M-1021-01

Title: *Conservative Versus Fast Track Rule Out Myocardial Infarction Protocols: A Cost And Length Of Stay Comparison With Low Risk Chest Pain Patients In A Military Hospital*

Contract No.

Principal Investigator: Paul D. McGough, P.I., Student
Mary Stoeckle, Ph.D., Faculty Advisor
Department: College Of Nursing & Health

The Institutional Review Board named above has taken the following action with regard to the use of human subjects on this proposed project:

_____ Approved

**SEE ATTACHED X Approved pending receipt of the items listed **

The conditions, if any, are attached and are signed by the Committee Chairer. If disapproved, the reasons are attached and are signed by the Committee Chairer and by other consultants, if any.

REMINDER: FDA regulations require prompt reporting to the IRB of any changes in research activity, changes in approved research during the approval period may not be initiated without IRB review (submission of an amendment), and prompt reporting of any unanticipated problems (adverse events).

Eugene P. Kern
Signed _____ Coordinator, WSU-IRB
Date: March 21, 1997

This approval is effective only through: March 21, 1998

This activity may be initiated *only* after any restrictions that may have been placed on this study by the Board have been addressed and removed. To continue the activities approved under this protocol you should receive the appropriate form(s) from Research and Sponsored Programs (RSP) two to three months prior to the required due date. If you do not receive this notification, please contact RSP at 775-2425.

PLEASE RESPOND:

***NOTE:** *When responding, please Hi-lite the requested changes made to your revised document(s) . Unless otherwise noted, only one (1) copy of the requested item(s) need be submitted for your response.*

Please be aware that the activities covered by this action may not be initiated until all conditions have been removed and subsequent final approval has been recommended.

*The Committee recommended the retrospective record review for Expedited Review provided the following conditions are met:

- a. Clarify that the data being reviewed has been recorded prior to April 1, 1997.
- b. Provide a copy of the data collection tool and the inclusion/exclusion criteria.
- c. Receipt, when available, of a letter of permission from the individual(s) having responsibility for the records being reviewed.

****The above conditions have been lifted upon receipt of the items, as requested above, from PI noting that he has conformed to the Conditions the Screening committee placed on this research study. This study now has final approval and the Principal Investigator may proceed with this research protocol.**

Appendix C
Agency Internal Review Approval Letter



DEPARTMENT OF THE AIR FORCE

HEADQUARTERS AIR FORCE MATERIEL COMMAND
WRIGHT PATTERSON AIR FORCE BASE OHIO

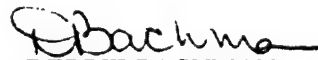
25 April 1997

MEMORANDUM FOR MAJ PAUL D. MCGOUGH

FROM: 74th Medical Group/SGHT
Clinical Investigations
4881 Sugar Maple Drive
Wright-Patterson AFB OH 45433-5300

SUBJECT: Proposed Protocol

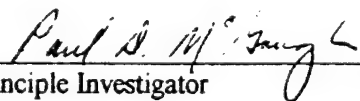
1. The protocol you submitted, "Conservative vs. Fast Track Rule Out Myocardial Infarction Protocols: A Cost and Length of Stay Comparison With Low Risk Chest Pain Patients in a Military Hospital," was reviewed via expedited review by the Chair of the Institutional Review Board (IRB) of Wright-Patterson Medical Center on 24 April 1997 and has been assigned file number #97-X04. Your protocol was determined to be exempt and has been approved.
2. Progress reports will be due annually. You will receive a reminder 30 days in advance when your report is due. If you complete your study prior to April 1998 a final report may be completed. I have attached a blank form for your report.
3. Any unanticipated major adverse reactions or other medical misadventures must be reported immediately to the department chairperson, the Chief of Medical Staff, the Clinical Investigations Coordinator and ultimately the commander IAW AFI 40-403. Such events will also need to be summarized in the subsequent progress report.
4. If you anticipate separating from the Air Force or changing assignments before the protocol is completed, you must notify the Clinical Investigations Office as soon as this is known. You will be required to either formally close the protocol, or to have another investigator take over the study. The latter process requires nomination by the department chairperson, submission of a curriculum vitae, and approval by the Institutional Review Board.
5. Please indorse below and return to Clinical Investigations (SGHT). I hope that your study will prove to be a worthwhile experience for you. Let us know if there is any way we can assist you.


DEBBIE BACHMAN
Clinical Investigations Coordinator

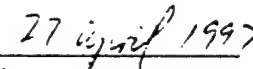
1st IND

TO: SGHT/Clinical Investigations

Noted/Acknowledged



Principle Investigator



Date 27 April 1997

Appendix D
Data Collection Tool

APPENDIX D

Code no. _____ Included _____ had MI Y N
 Age _____ Omitted _____
 Sex _____

Chest pain with low risk for acute myocardial infarction criteria:

	Y	N
1. Absence of significant documented cardiac history	—	—
2. Absence of acute ischemia or infarction on ED ECG	—	—
3. Absence of ventricular couplets or bigeminy in ED	—	—
4. Absence of PSVT or arrhythmias requiring IV treatment	—	—
5. Absence of 2nd or 3rd Degree A-V Block or new BBB	—	—
6. Absence of persistent or recurrent ischemia after initial ED TX	—	—
7. Need for intravenous nitroglycerin in ED	—	—
8. Systolic blood pressure > 200 mm Hg or < 100 mm HG	—	—
9. Diastolic blood pressure > 120	—	—
10. Congestive heart failure or conditions requiring IV medications	—	—

Appendix E

Conventional vs. Fast-track protocol Costs

APPENDIX E

Code no. _____

Cost of hospitalization vs Cost of utilization of Chest Pain Center protocols

Length of Stay measured in days

REVIEW 1

REVIEW 2

Conventional Protocol

Fast Track Protocol

Cost of CCU Bed Day \$1632.72	Cost of treatment in Chest pain center protocol with discharge <24 hours CK-MB on adm \$13.79 CK-MB @ 3 hours \$13.79 CK-MB @ 6 hours \$13.79 CK-MB @ 9 hours \$13.79
Cost of Telemetry Bed Day \$501.76	Continuous 12 lead ECG and serial ST segment trend monitoring for 9 hours \$154.71
	Two-dimensional echocardiography \$184.03
	Bruce protocol exercise stress test \$154.71
	Cost of ED admission including labs and misc. \$176.99
	Cost of Cardiology Consultation \$123.09
	Cost of Chest Pain Center Visit <div style="text-align: right;">\$ 847.09</div>
	Length of stay in days < 1

Appendix F
Clinical Records Permission Letter

8 April 1997

TO: Research and Sponsored Programs
Wright State University
Dayton, OH

FROM: 74 Medical Group
Clinical Records
WPAFB, OH

SUBJECT: Use of Clinical Records for retrospective audit in fulfillment of thesis

Major Paul D. McGough is granted permission to utilize clinical records at this institution in fulfillment of research applied to his thesis. The clinical records will be reviewed within the clinical records department and confidentiality will be maintained.

Kay Skatton, MA HRT
Clinical Records Department

Appendix G

References

APPENDIX G

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